



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: CHAMBERLAIN

Examiner: Desire, G.

Serial No.: 09/961,237

Group Art Unit: 2625

Filed: September 20, 2001

Docket No.: **TUC920010065US1**
(2003901-0509-B-DWL)

Title: METHOD AND APPARATUS USING DUAL BOUNDING BOXES AS
DYNAMIC TEMPLATES FOR CARTRIDGE RACK IDENTIFICATION AND
TRACKING

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence and the papers, as described hereinabove, are being deposited in the United States Postal Service, as first class mail, in an envelope addressed to: Mail Stop APPEAL, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on February 27, 2006.

By: 

David W. Lynch

APPEAL BRIEF

MAIL STOP APPEAL
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an Appeal Brief submitted pursuant to 37 C.F.R. § 41.37 for the above-referenced patent application. Please charge Deposit Account No. 09-0499
09-0449
(**TUC920010065US1**) in the amount of \$500.00 for this brief in support of appeal as indicated in 37 C.F.R. § 41.20(b)(2).

I. Real Party in Interest

The real party in interest is International Business Machines Corporation, having a place of business at New Orchard Road, Armonk, New York 10504. This application is assigned to International Business Machines Corporation.

II. Related Appeals and Interferences

Appellants are unaware of any related appeals, interferences or judicial proceedings.

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III. Status of Claims

Claims 1, 5-7, 11-13, 17-19, 23, and 24 were rejected. Claims 2-4, 8, 10, 14-16 and 20-22 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claims 1, 5-7, 11-13, 17-19, 23, and 24 are presented for appeal and may be found in the attached Appendix of Appealed Claims in their present form.

IV. Status of Amendments

No amendments to the claims were made subsequent to the final rejection of Appellants' application.

V. Summary of Invention

The present invention includes embodiments of a method and apparatus using dual bounding boxes as dynamic templates for cartridge rack identification and tracking. Key pre-existing elements of the cartridge slot features are identified. Consequently, every cell can be calibrated, and no X-Y area is consumed for a fiducial mark, so cartridge storage can be maximally packed in a given wall area, which in turn maximizes library system storage capacity and simplifies magazine mold design.

Independent claims 1 is directed to an imaging tape cartridge picker system for use in aligning a tape cartridge picker with cartridges in cells of a tape cartridge magazine and recites a picker assembly (Fig. 2, 210; page 11, lines 17-18), illumination sources disposed at the front of the picker assembly for illuminating an object (Fig. 2, 230; page 11, lines 21-22), an imager disposed on the front of the picker assembly for gathering image data of the object (Fig. 2, 220; page 11, lines 19-21) and a processor (Fig. 2, 240; page 11, lines 22-23), coupled to the imager and illumination sources, for thresholding (Fig. 7, 700; page 15, line

22 to page 17, line 2) the image data obtained from the imager and for controlling the illumination sources, wherein the processor uses bounding boxes (Fig. 8, 800; page 17, lines 3-5) to identify the location of a desired physical feature in the thresholded image.

Independent claims 7 is directed to a method for use in aligning a tape cartridge picker with cartridges in cells of a tape cartridge magazine, and recites illuminating an object with an illumination source (Fig. 2, 230; page 11, lines 21-22), gathering image data for the illuminated object (Fig. 2, 220; page 11, lines 19-21) and processing (Fig. 5, 510-570, page 14, line 4 to page 15, line 20) the image data by using bounding boxes (Fig. 8, 800; page 17, lines 3-5) to identify the location of a desired physical feature in the thresholded image.

Independent claims 13 is directed to an article of manufacture that includes a program storage medium readable by a computer tangibly embodying one or more programs of instructions executable by the computer to perform a method for use in aligning a tape cartridge picker with cartridges in cells of a tape cartridge magazine. The method includes illuminating an object with an illumination source (Fig. 2, 230; page 11, lines 21-22), gathering image data for the illuminated object (Fig. 2, 220; page 11, lines 19-21) and processing (Fig. 5, 510-570, page 14, line 4 to page 15, line 20) the image data by using bounding boxes (Fig. 8, 800; page 17, lines 3-5) to identify the location of a desired physical feature in the thresholded image.

Independent claims 19 is directed to an imaging tape cartridge picker system for use in aligning a tape cartridge picker with cartridges in cells of a tape cartridge magazine, and recites a picker assembly (Fig. 2, 210; page 11, lines 17-18), illuminating means disposed at the front of the picker assembly for illuminating an object (Fig. 2, 230; page 11, lines 21-22), imaging means disposed on the front of the picker assembly for gathering image data of the

object (Fig. 2, 220; page 11, lines 19-21) and processing means (Fig. 2, 240; page 11, lines 22-23), coupled to the imaging means and illuminating means, for thresholding (Fig. 7, 700; page 15, line 22 to page 17, line 2) the image data obtained from the imaging means and for controlling the illuminating means, wherein the processing uses bounding boxes (Fig. 8, 800; page 17, lines 3-5) to identify the location of a desired physical feature in the thresholded image.

VI. Grounds of Rejection

Appellant has attempted to comply with new rule 37 C.F.R. § 41.37(c) by providing the Office Action's grounds of rejection verbatim, followed by an argument section corresponding thereto.

- A. In paragraph 6 on page 3 of the Office Action, claims 1, 5-7, 11-13, 17-19, 23, and 24 were rejected under 35 U.S.C. § 102(e) over Reasoner (U.S. Patent No. 6,634,553).

VII. Argument

- A. INDEPENDENT CLAIMS 1, 7, 13 AND 19 ARE PATENTABLE OVER REASONER, ET AL. (U.S. PATENT NO. 6,634,553).**

- 1. REASONER, ET AL. DO NOT IDENTIFY A LOCATION OF A PHYSICAL FEATURE OF A CARTRIDGE.**

Reasoner, et al. provides a system that improves upon the reading of bar codes or other labels on a cartridge. However, Reasoner does not describe exactly how the target area containing the bar code is located. Reasoner, et al. states, "light from the array is reflected off of the label, and the reflected light is then detected by a charge coupled device (CCD)."

Reasoner, et al. further states that a lens is used in conjunction with one or more of the light elements so that light reflecting off the rear of a magazine area can be detected.

The CCD array generates a voltage that is proportional to the amount of light that is detected. These voltages are output to a processor or other device that processes the CCD voltage levels to detect the white spaces and dark bars of a bar code label. The LEDs throw light in a broad vertical pattern of approximately 120 degrees, while constrained to a narrower horizontal pattern of approximately 45 degrees. Thus, the positioning capability provided by Reasoner is crude and not very accurate, i.e., when light is reflected, the picker assembly assumes it is in front of a storage magazine.

Moreover, according to Reasoner, once the bar code is detected, picker assembly 10 may engage data cartridge 20 to move it to another location, such as to a read/write drive. If the bar code is detected, but cannot be decoded, then picker assembly 10 can move left or right relative to data cartridge 20 to attempt to read the left edge 22a or right edge 22b of label area 22.

Clearly, Reasoner suggests that trial and error may be used to attempt to read the bar code. Accordingly, Reasoner does not describe identifying the location of the cartridge. Moreover, merely detecting the bar code does not enable the picker assembly 10 to align with the cartridge. In fact, Reasoner merely falls into the category of registration techniques described in Applicant's background of the invention wherein dropped cartridges and jams may arise due to inaccurate alignment of the picker assembly with the cartridge. While Reasoner may improve upon the reading of labels, Reasoner fails to suggest any processing of reflected light signals to identify the location of a desired physical feature as recited in the claims.

In contrast, Applicant's invention recites "imaging tape cartridge picker system" that is able to locate physical features in the thresholded image to identify the position of a cartridge. More specifically, claim 1, for example, recites that the processor "uses bounding boxes to identify the location of a desired physical feature in the thresholded image."

Because Reasoner et al. merely uses a crude method of determining when the picker assembly is in front of a storage magazine, Reasoner et al. fails to suggest how the picker assembly 10 "knows" when it is positioned in front of data cartridge 20.

Moreover, according to Reasoner, et al., "[i]t will be understood that processing the output of a CCD device to detect a bar code is well known, although not trivial. Accordingly, such processing is not discussed further in the present description, other than to note that the complexity of the bar code reading algorithm is selected based in part upon the quality and evenness of the bar code illumination."

Therefore, Reasoner et al. fail to disclose, teach or suggest identifying the location of a desired physical feature. For this reason, it is respectfully submitted that claims 1, 7, 13 and 19 are patentable over Reasoner et al.

2. REASONER, ET AL. DO NOT SUGGEST THRESHOLDING THE IMAGE DATA OBTAINED FROM THE IMAGER.

Reasoner, et al. does not discuss thresholding an image obtained from an imager. Rather, Reasoner et al. merely describes detecting light reflected off of the storage magazine using a charge coupled device (CCD). According to Reasoner et al., the CCD array generates a voltage that is proportional to the amount of light that is detected. These voltages are output to a processor or other device that processes the CCD voltage levels to detect the

white spaces and dark bars of a bar code label. However, Reasoner et al. does not even suggest thresholding an image for identifying a physical feature of an object.

Therefore, Reasoner et al. fail to disclose, teach or suggest thresholding the image data obtained from the imager. For this reason, it is respectfully submitted that claims 1, 7, 13 and 19 are patentable over Reasoner et al.

3. REASONER, ET AL. DO NOT SUGGEST USES BOUNDING BOXES TO IDENTIFY THE LOCATION OF A DESIRED PHYSICAL FEATURE IN THE THRESHOLDED IMAGE.

As described above, Reasoner merely identifies a storage magazine using a crude positioning method and then reads a bar code proximate a storage magazine by directing light from LEDs in a broad vertical pattern of approximately 120 degrees, while constrained to a narrower horizontal pattern of approximately 45 degrees. The CCD array then generates a voltage that is proportional to the amount of light that is detected. These voltages are output to a processor or other device that processes the CCD voltage levels to detect the white spaces and dark bars of a bar code label.

Accordingly, Reasoner et al., at best, merely improves upon the reading of labels by describing a method for illuminating a label and processing the CCD voltage levels to detect the white spaces and dark bars of a bar code label.

However, Reasoner et al., does not describe the processing of data collected by the picker assembly to provide bounding boxes that are used to identify the location of a desired physical feature in the thresholded image.

Therefore, Reasoner et al. fail to disclose, teach or suggest using bounding boxes to identify the location of a desired physical feature in the thresholded image. For this reason, it is respectfully submitted that claims 1, 7, 13 and 19 are patentable over Reasoner et al.

B. DEPENDENT CLAIMS 5, 11, 17 AND 23 ARE PATENTABLE OVER REASONER, ET AL. (U.S. PATENT NO. 6,634,553).

Claim 5 recites that "the desired physical feature comprises a top left intersection of a vertical and horizontal member of a cartridge cell within a tape library system."

Reasoner et al. fails to suggest recognizing any particular physical feature of a storage magazine. Rather, as described above, Reasoner et al. merely describes a crude method of perceiving when the light from the LEDs is being reflected off the back of a storage magazine. Light from the LEDs is formed in a broad vertical pattern of approximately 120 degrees, while constrained to a narrower horizontal pattern of approximately 45 degrees.

Moreover, according to Reasoner, once the bar code is detected, picker assembly 10 may engage data cartridge 20 to move it to another location, such as to a read/write drive. If the bar code is detected, but cannot be decoded, then picker assembly 10 can move left or right relative to data cartridge 20 to attempt to read the left edge 22a or right edge 22b of label area 22.

Clearly, Reasoner suggests that trial and error may be used to attempt to read the bar code. Accordingly, Reasoner does not describe identifying a top left intersection of a vertical and horizontal member of a cartridge cell within a tape library system. For this reason, it is respectfully submitted that dependent claims 5, 11, 17 and 23 are patentable over Reasoner et al. .

C. DEPENDENT CLAIMS 6, 12, 18 AND 24 ARE PATENTABLE OVER REASONER, ET AL. (U.S. PATENT NO. 6,634,553).

Claim 6 recites that the position of the intersection relative to the imager is used to calibrate the physical position of the picker assembly.

Reasoner et al. fails to suggest calibrating the position of a picker assembly. Rather, Reasoner suggests that trial and error may be used to attempt to read the bar code. Reasoner et al. does not even appear to be concerned with calibration or accuracy during location of a target area. The crude method of identifying the back of storage magazine places the reader in the "ballpark" of the target area, and then the broad projection of light by the LEDs enables the bar code to be read. For this reason, it is respectfully submitted that dependent claims 6, 12, 18 and 24 are patentable over Reasoner et al. .

VIII. Conclusion

In view of the above, Appellants submit that the rejections are improper, the claimed invention is patentable, and that the rejections of claims 1, 5-7, 11-13, 17-19, 23, and 24 should be reversed. Appellants respectfully request reversal of the rejections as applied to the appealed claims and allowance of the entire application.

Respectfully submitted,

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APPENDIX OF APPEALED CLAIMS FOR APPLICATION NO. 09/961,237

1 1. (Original) An imaging tape cartridge picker system for use in aligning a
2 tape cartridge picker with cartridges in cells of a tape cartridge magazine, comprising:
3 a picker assembly;
4 illumination sources disposed at the front of the picker assembly for illuminating an
5 object;
6 an imager disposed on the front of the picker assembly for gathering image data of
7 the object; and
8 a processor, coupled to the imager and illumination sources, for thresholding the
9 image data obtained from the imager and for controlling the illumination sources;
10 wherein the processor uses bounding boxes to identify the location of a desired
11 physical feature in the thresholded image.

1 2. (Original) The imaging tape cartridge picker system of claim 1 wherein
2 the processor identifies the location of the desired physical feature using the bounding boxes
3 by finding a vertical feature of the desired physical feature by finding a valid vertical
4 bounding box, determining whether a valid vertical feature is found, using the valid vertical
5 feature as a reference point for the search for the horizontal feature and finding a valid
6 horizontal bounding box of the desired physical feature when a vertical feature is positively
7 identified, determining whether a valid horizontal feature is found and identifying a top-left
8 intersection of the vertical and horizontal bounding boxes with the bottom-right corner of the
9 desired physical feature when a valid horizontal feature is found.

1 3. (Original) The imaging tape cartridge picker system of claim 2 wherein
2 the desired physical feature comprises a top left intersection in a bottom-right corner of a
3 vertical and horizontal member of a cartridge cell within a tape library system.

1 4. (Original) The imaging tape cartridge picker system of claim 3 wherein
2 the position of the intersection relative to the imager is used to calibrate the physical position
3 of the picker assembly.

1 5. (Original) The imaging tape cartridge picker system of claim 1 wherein
2 the desired physical feature comprises a top left intersection of a vertical and horizontal
3 member of a cartridge cell within a tape library system.

1 6. (Original) The imaging tape cartridge picker system of claim 5 wherein
2 the position of the intersection relative to the imager is used to calibrate the physical position
3 of the picker assembly.

1 7. (Original) A method for use in aligning a tape cartridge picker with
2 cartridges in cells of a tape cartridge magazine, comprising:
3 illuminating an object with an illumination source;
4 gathering image data for the illuminated object; and
5 processing the image data by using bounding boxes to identify the location of a
6 desired physical feature in the thresholded image.

1 8. (Original) The method of claim 7 wherein the processing the image data
2 by using bounding boxes further comprises:
3 finding a vertical feature of the desired physical feature by finding a valid vertical
4 bounding box;
5 determining whether a valid vertical feature is found;
6 using the valid vertical feature as a reference point for the search for the horizontal
7 feature and finding a valid horizontal bounding box of the desired physical feature when a
8 vertical feature is positively identified;
9 determining whether a valid horizontal feature is found; and
10 identifying a top-left intersection of the vertical and horizontal bounding boxes with
11 the bottom-right corner of the desired physical feature when a valid horizontal feature is
12 found.

1 9. (Original) The method of claim 8 wherein the desired physical feature
2 comprises a top left intersection of a vertical and horizontal member of a cartridge cell within
3 a tape library system.

1 10. (Original) The method of claim 9 further comprising using the position of
2 the intersection relative to the imager to calibrate the physical position of the picker
3 assembly.

1 11. (Original) The method of claim 7 wherein the desired physical feature
2 comprises a top left intersection of a vertical and horizontal member of a cartridge cell within
3 a tape library system.

1 12. (Original) The method of claim 11 further comprising using the position
2 of the intersection relative to the imager to calibrate the physical position of the picker
3 assembly.

1 13. (Original) An article of manufacture comprising a program storage
2 medium readable by a computer, the medium tangibly embodying one or more programs of
3 instructions executable by the computer to perform a method for use in aligning a tape
4 cartridge picker with cartridges in cells of a tape cartridge magazine, the method comprising:
5 illuminating an object with an illumination source;
6 gathering image data for the illuminated object; and
7 processing the image data by using bounding boxes to identify the location of a
8 desired physical feature in the thresholded image.

1 14. (Original) The article of manufacture of claim 13 wherein the processing
2 the image data by using bounding boxes further comprises:

3 finding a vertical feature of the desired physical feature by finding a valid vertical
4 bounding box;

5 determining whether a valid vertical feature is found;

6 using the valid vertical feature as a reference point for the search for the horizontal
7 feature and finding a valid horizontal bounding box of the desired physical feature when a
8 vertical feature is positively identified;

9 determining whether a valid horizontal feature is found; and

10 identifying a top-left intersection of the vertical and horizontal bounding boxes with
11 the bottom-right corner of the desired physical feature when a valid horizontal feature is
12 found.

1 15. (Original) The article of manufacture of claim 14 wherein the desired
2 physical feature comprises a top left intersection of a vertical and horizontal member of a
3 cartridge cell within a tape library system.

1 16. (Original) The article of manufacture of claim 15 further comprising
2 using the position of the intersection relative to the imager to calibrate the physical position
3 of the picker assembly.

1 17. (Original) The article of manufacture of claim 13 wherein the desired
2 physical feature comprises a top left intersection of a vertical and horizontal member of a
3 cartridge cell within a tape library system.

1 18. (Original) The article of manufacture of claim 17 further comprising
2 using the position of the intersection relative to the imager to calibrate the physical position
3 of the picker assembly.

1 19. (Original) An imaging tape cartridge picker system for use in aligning a
2 tape cartridge picker with cartridges in cells of a tape cartridge magazine, comprising:
3 a picker assembly;
4 illuminating means disposed at the front of the picker assembly for illuminating an
5 object;
6 imaging means disposed on the front of the picker assembly for gathering image data
7 of the object; and
8 processing means, coupled to the imaging means and illuminating means, for
9 thresholding the image data obtained from the imaging means and for controlling the
10 illuminating means;
11 wherein the processing uses bounding boxes to identify the location of a desired
12 physical feature in the thresholded image.

1 20. (Original) The imaging tape cartridge picker system of claim 19 wherein
2 the processing means identifies the location of the desired physical feature using the
3 bounding boxes by finding a vertical feature of the desired physical feature by finding a valid
4 vertical bounding box, determining whether a valid vertical feature is found, using the valid
5 vertical feature as a reference point for the search for the horizontal feature and finding a
6 valid horizontal bounding box of the desired physical feature when a vertical feature is
7 positively identified, determining whether a valid horizontal feature is found and identifying
8 a top-left intersection of the vertical and horizontal bounding boxes with the bottom-right
9 corner of the desired physical feature when a valid horizontal feature is found.

1 21. (Original) The imaging tape cartridge picker system of claim 20 wherein
2 the desired physical feature comprises a top left intersection of a vertical and horizontal
3 member of a cartridge cell within a tape library system.

1 22. (Original) The imaging tape cartridge picker system of claim 21 wherein
2 the position of the intersection relative to the imager is used to calibrate the physical position
3 of the picker assembly.

1 23. (Original) The imaging tape cartridge picker system of claim 19 wherein
2 the desired physical feature comprises a top left intersection of a vertical and horizontal
3 member of a cartridge cell within a tape library system.

1 24. (Original) The imaging tape cartridge picker system of claim 23 wherein
2 the position of the intersection relative to the imager is used to calibrate the physical position
3 of the picker assembly.

APPENDIX OF EVIDENCE FOR APPLICATION NO. 09/961,237

Appellants are unaware of any evidence submitted in this application pursuant to 37 C.F.R. §§ 1.130, 1.131, and 1.132.

APPENDIX OF RELATED PROCEEDINGS FOR APPLICATION NO. 09/961,237

As stated in Section II above, Appellants are unaware of any related appeals, interferences or judicial proceedings.